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TECHNICAL NOTE

CAN PULPMILL WOOD WASTE BE USED FOR LAND RECLAMATION

In recent greenhouse trials it was demonstrated that tree seedlings can be grown in pulpmill wood waste. Some success was also achieved in using this material as a soil suppiement prior to reforesting nonproductive forest lands on Fraser Inc. Limits near Second Falls, N.B.

Building of roads, landings, and skid trails and operational techniques have created problems in the woodlands and on many farmlands that have resulted in a loss of organic matter and serious degradation of the productive capacity of the soil. It now appears that pulpmill wood waste, which is currently a disposal problem for the industry, may be an important source of organic matter for the reclamation of these nonproductive forest lands.

Pulpmills can generate more than 385 m^3 of wood waste daily. In a pulpmill there are three major waste products: knots, clarifier sludge, and grit.

In most mills, the knots which cannot be used in the pulping process are used as a hog fuel and thus are rarely a waste product. Clarifier sludge is the broken wood fiber that collects in the bottom of the clarifier. It represents about 10% of the mills wood waste. The residual from the grit chamber is a combination of bark, branches, stones, and dirt. This material is not suitable as a hog fuel because of the stones and dirt, and represents about 80% of the wood waste.

These materials are considered to be an industrial waste and some provinces require that they be dumped in specially constructed disposal sites. Disposal can cost \$6/m^3 or more.

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GREENHOUSE TRIALS:

In this study, the suitability of each component of pulpmill wood waste was tested as a growing medium for black spruce seedlings. The initial tests were conducted in the Acadia Forest Experiment Station greenhouses using wooden boxes (120 x 120 x 30 cm) as simulated transplant beds. Each component of the wood waste and a composite of all three waste products were tested separately. A fifth box was filled with nursery soil as a control. Each box was divided; half contained only the component being tested while the other half had the material spread over 10 to 13 cm of gravel to form a growing medium. Twenty-one black spruce seedlings were planted in each box.

Each test was replicated 4 times. Two of the replicates were irrigated as required with water only and received no fertilizer. The remaining two replicates were fertilized with soluble fertilizer (10-52-10 and 20-20-20) by the replacement method.

Results of Greenhouse Trials:

After 29 weeks in the greenhouse, it was clear that all the waste products could support the growth of black spruce seedlings. With routine fertilizer treatments, the height growth of seedlings in grit, sludge, or a composite of all the waste products was acceptable when compared with seedlings grown in the fertilized nursery soil (Table 1). The seedlings growing in fertilized knots had reduced growth.

Table 1. Height (cm) of black spruce seedling grown in pulpmill waste in the greenhouse

Growing medium	Fertilized	Unfertilized
Loam	85.4 ± 11.4	47.2 ± 7.4
Loam over gravel	80.2 ± 13.2	43.4 ± 8.6
Grit	44.5 ± 8.3	19.2 ± 2.5
Grit over gravel	59.6 ± 8.1	19.0 ± 2.3
Composite	46.6 ± 10.2	19.5 ± 3.1
Composite over gravel	59.3 ± 9.7	20.6 ± 3.1
Sludge	54.8 ± 9.9	20.6 ± 3.3
Sludge over gravel	59.2 ± 9.7	19.6 ± 3.0
Knots	25.2 ± 4.9	20.0 ± 2.8
Knots over gravel	41.0 ± 11.0	20.7 ± 3.2

Height when planted: 13 ± 2.0 cm.

Seedlings grown in all waste mediums without additional fertilizer had greatly reduced growth, and poor color. Also, seedlings grown in the unfertilized nursery soil did not perform as well as those in the fertilized nursery soil. The survival rate was nearly 100% for all the waste and nursery soil treatments. With fertilizer, the growth was slightly better in the growing medium spread over a layer of gravel. In the unfertilized treatments this difference was not apparent.

FIELD TRIALS:

As a result of the greenhouse tests, field trials were established in June 1986, on an unproductive log landing area east of Second Falls, Madawaska Co., N.B. In these trials, each of the three waste products was spread over two sections of the landing area at a depth of about 25 cm. On one section, a bulldozer with a ripper tooth was used to mix the wood with the mineral soil. Each test area was divided into quarters, two of which were planted in June with overwintered nursery stock from both the Fraser's nursery and the Department of Natural Resources and Energy (DNRE) Nursery at Kingsclear, N.B. The remaining quadrats will be planted in the spring of 1987.

The stock had good survival but poor growth performance and were a yellowish color which suggests a nutrient deficiency. When the area was sampled in the fall of 1986 there was no apparent difference between the growth of seedling from the DNRE nursery and those from the Fraser's nursery. Growth and survival on both the ripped and unripped areas were similar.

Chemical analysis of the wood wastes, indicates they contain adequate nutrient levels and a high carbon:nitrogen (C:N) ratio. Soils with a high C:N ratio tend to have a reduced nutrient availability. Over time, biological activity reduces the C:N ratio and increases the availability of nutrients.

CONCLUSIONS

It has been demonstrated that black spruce seedlings can be successfully grown in pulpmill wood waste. However, at least during the first year, there is a shortage of available nutrients for optimum growth.

Before this type of material can be recommended as a soil supplement to reclaim nonproductive forest lands, several questions must be answered:

1. How long will it take for natural biological activity to reduce the C:N ratio to a level that will supply adequate nutrients for seedling growth.

2. Is there an economic and biologically acceptable method for overcoming the initial lack of nutrient availability so that seedlings can be planted and grown satisfactorily without unreasonable delay?

3. What is the optimum depth of wood wastes on reclaimed land for adequate growth and development of seedlings.

Further research is necessary to answer these questions.

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